FISHERY RESEARCH

Brook Trout Removal, Stocking Cutthroat trout Fry, and Tributary Closures as Means for Restoring Cutthroat Trout in Priest Lake Tributaries

Job Completion Report
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Abstract

Densities of cutthroat trout *Oncorhynchus clarki lewisii* declined in the Priest Lakes and their tributaries from the middle 1950's to the early 1980's (Bjornn 1957; Mauser and Ellis 1985). Factors responsible for this decline were over-exploitation, competition with introduced species, and habitat degradation/alteration. In 1982, studies were begun to evaluate the potential for increasing the abundance of cutthroat trout by removing brook trout *Salvelinus fontinalis,* stocking cutthroat trout fry, and reducing the harvest of fish from tributaries. Fish densities were assessed by snorkeling pools in previously established study creeks. In larger tributaries, fish were counted in stream sections that were 0.3 or 0.6 km long and contained five to ten pools per section.

In 1987, one year after brook trout were removed from Cache Creek and we started stocking cutthroat trout fry, the density of age I cutthroat trout was 0.5 fish/m ; in 1988, the density of age II fish was 0.12 m . Before the stocking of fry in 1986, only two cutthroat trout were observed in the lower three-fourths of Cache Creek. Attempts to re-establish cutthroat trout by stocking fry on top of resident brook trout have been less successful than when fry were stocked in streams without brook trout. Tributaries on the east side of Priest Lake had higher densities of cutthroat trout in 1988 than in 1982, the year when all major tributaries were closed to fishing. Densities of cutthroat trout in west side tributaries changed little during the period of closure.

Objectives

1. To determine if brook trout need to be removed before cutthroat trout fry are stocked.

2. To determine if creeks dominated by brook trout can be brought back into cutthroat trout production by stocking cutthroat trout fry.

3. To determine if creeks with low abundances of resident cutthroat trout can be brought into full production with the supplementation of hatchery fry.

4. To evaluate cutthroat trout abundances as related to closure of tributaries to angling.

Introduction

Over the past 50 years the density of Westslope cutthroat trout *Oncorhynchus clarki lewisii* in Priest Lake and its tributaries (Figure 1) declined (Bjornn 1957; Mauser and Ellis 1985). Introduction of exotic species, over-fishing, habitat destruction and alteration, and perhaps genetic introgression played roles in reducing the abundance of cutthroat trout. Many tributaries in the Priest Lake drainage appear to be underseeded with cutthroat trout while the introduced brook trout *Salvelinus fontinalis* continued to expand its range.

The purposes of this investigation were to (1) evaluate the cutthroat trout density in Cache Creek where brook trout were removed, (2) assess the density of cutthroat trout in Blacktail Creek where cutthroat trout fry were stocked in a stream with brook trout present, (3) evaluate the density of cutthroat trout in Packer Creek where fry were stocked in a stream with cutthroat trout present, and (4) to assess the effects of a restrictive angling regulation on the abundance of cutthroat trout in major tributaries of Priest Lake.

Beginning in 1982, study sections were established in major tributaries of the Priest Lakes, and data to assess fish densities were collected (Irving 1987). Irving (1987) conducted **a** test of stocking rates for cutthroat trout fry and the survival of cutthroat trout fry in creeks with and without brook trout present. Cowley (1987) removed brook

trout from Cache Creek and then stocked it with cutthroat trout fry. He also established and monitored fish abundances in pools in small tributaries with and without brook trout present and evaluated fish densities in study sections established in 1982.

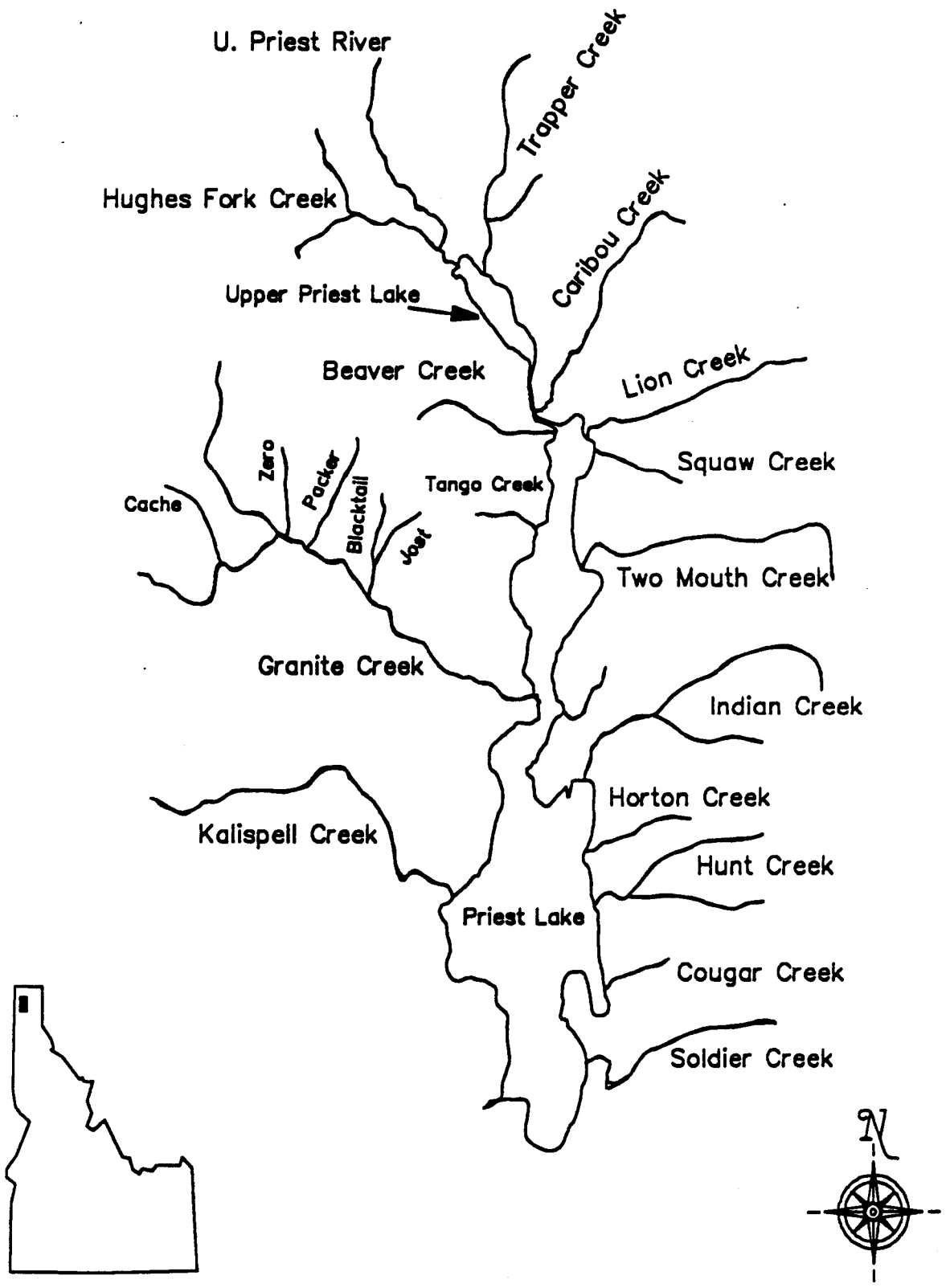

Figure 1. Map of Priest Lake located in northern Idaho.

Methods

Removal of Brook Trout and Stocking of Cutthroat Trout Fry

Cowley (1987) selected 21 pools throughout Cache Creek to assess changes in abundance of trout following the removal of brook trout. The pools varied in size and depth. In 1986, sodium cyanide was added to Cache Creek to facilitate the removal of brook trout. Snorkel observations from Cowley (1987) showed that all fishes were removed. Before and after the chemical application fish abundance was censured in the study pools of Cache Creek by snorkeling. Cutthroat trout fry were stocked within days of the brook trout removal in 1986 and in subsequent years and their numbers were monitored by snorkeling in 1986, 1987, and 1988 (Cowley 1987). Fishes were identified as to species and size group.

A meter stick with size-group markings of 0-50 mm, 51-100 mm, and 100+ mm was used to determine the size of the observed fishes and to place them into age classes. In late summer the age 0 fish were usually no longer than 50 mm, age I fish were 51-100mm, and age II and older fish were longer than 100 mm (Griffith 1972).

Cache Creek was stocked with cutthroat trout fry after the removal of brook trout in 1986, and in July of 1987, and 1988 (Figure 2) at a rate of about five per m^2; a rate Irving (1987) found satisfactory to adequately stock such streams.

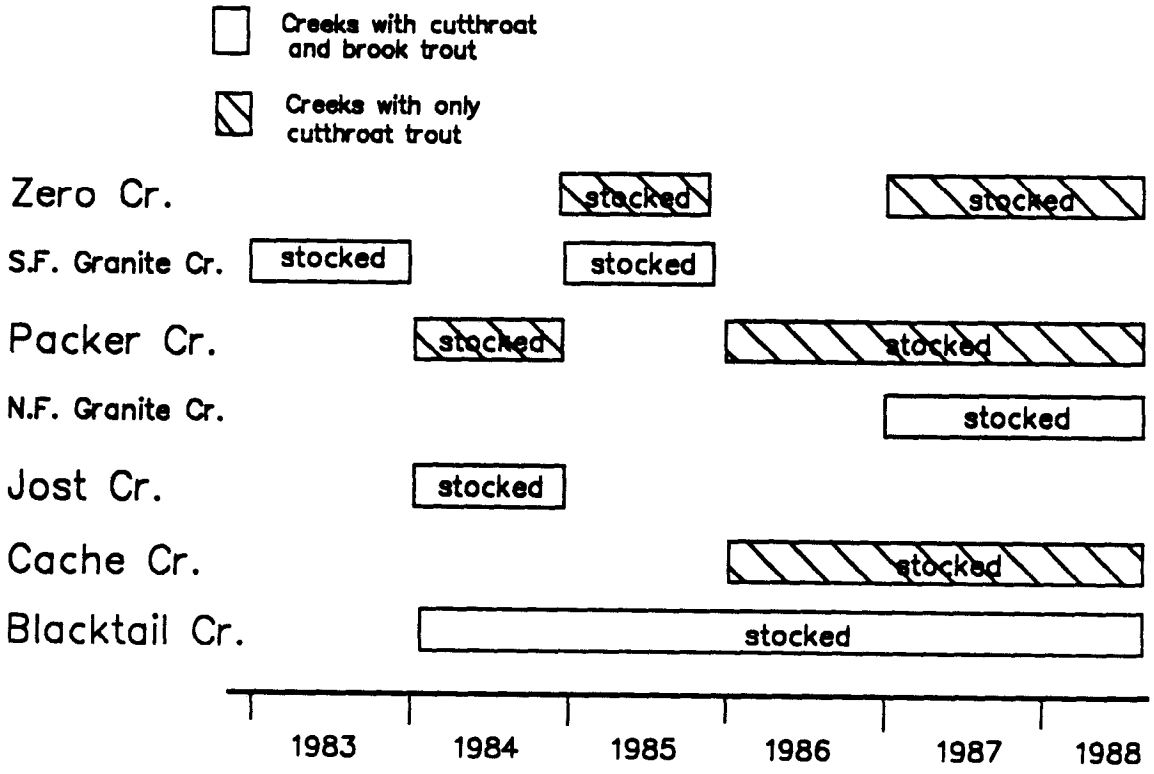

Figure 2. Species composition and years of cutthroat trout fry stocking for selected study creeks in the Granite Creek drainage of Priest Lake.

Cutthroat trout fry stocked in tributaries were from a brood stock maintained at Clark Fork State Fish Hatchery that originated from Granite Creek in the 1940's and was perpetuated at Kings Lake in

Washington. At a rate of five fry per m^2, about 97,000 fry were needed to stock Cache Creek. The fry were transported from the hatchery by truck in 1100 L tanks, counted volumetrically into five gallon plastic buckets or oxygen-filled plastic bags, depending on distance from the truck to the stream, and distributed along the shoreline a hundred meters up and downstream from each stocking location. Water temperatures were recorded and regulated in the fish truck to avoid thermal shock when the fish were transferred to each stream.

Fish were counted in selected pools by snorkeling prior to stocking fry and then again one and four weeks after stocking.

Stocking Cutthroat Trout Fry in Streams with Brook Trout

Cutthroat trout fry were stocked each year starting in 1984 in Blacktail Creek (Figure 2), a stream with brook and cutthroat trouts present. Jost Creek flows into Blacktail Creek (Figure 1) and both streams contained similar fish communities at the onset of this study. Jost Creek was held as an experimental control and left unstocked (except in 1984) while Blacktail Creek was stocked for five consecutive years to see if stocked cutthroat trout could replace the brook trout.

Ten pools were selected throughout each of the two creeks to assess changes in trout abundance (Cowley 1987; Irving 1987). Pools were marked with plastic flagging and located by hiking from the stream mouth to its source. Fish abundance was assessed by snorkeling in the pools before cutthroat trout fry were stocked and again one and four weeks after stocking in Blacktail Creek, but only once each summer in Jost Creek.

Stocking Cutthroat Trout Fry in a Stream with Cutthroat Trout

Packer Creek had a barrier near its mouth that prevented brook trout from occupying most of this tributary. Cutthroat trout fry were stocked in 1984, 1986, 1987, and 1988 (Figure 2) to determine if the abundance of the already present cutthroat trout above the barrier could be increased.

Thirty pools were selected by Cowley (1987) in Packer Creek to assess changes in fish abundance as described earlier for other streams. Counts were made before stocking and one and four weeks after the fry were stocked at a rate of five to ten fish/m^2.

Restrictive Angling Regulations

In 1982, all tributaries thought to be important nursery streams of cutthroat trout were closed to angling. Study sections were established in 1982 in the major Priest Lake tributaries and the entire 100 meters of each section was snorkeled to assess abundance of fish by species and age. Cowley (1987) resnorkeled the study sections in 1986.

In 1987, the sections used to monitor long-term response of fish to restrictive angling regulations and other factors were changed to 10 pools or runs in either two one-half mile sections containing at least 5 pools in each, or a one mile section containing at least ten pools or runs. Creeks that were long and diverse were usually divided into two sections of one-half mile each. In creeks that were more homogeneous and shorter, a one-mile section was used.

Section boundaries were usually established at a more or less permanent landmark such as a bridge, road intersection, or a United States Forest Service trail crossing. Stream distances were measured by truck odometer where the road paralleled the stream or from a map.

The number of pools in each section was counted and the total divided by the number of pools to be snorkeled (either five or ten depending on the section length) to obtain a sampling ratio for selection of pools to be snorkeled. In 1987 and 1988, fish were counted in each pool and three widths and the thalweg were measured to determine the surface area for each pool.

Removal of Brook Trout and Stocking of Cutthroat Trout Fry

One year after brook trout were removed from Cache Creek and cutthroat trout fry were stocked the density of age I cutthroat trout was 0.45 fish/m^2 (Figure 3); a density similar to those observed where fry were stocked in streams with only cutthroat trout present. Fry stocked during the summer of 1987 incurred low oxygen levels during transportation and mortalities attributed to hypoxia were estimated at about 30-40%. The low age I density of cutthroat trout in 1988 (Figure 3) is attributed to the poor condition of fry stocked the previous year.

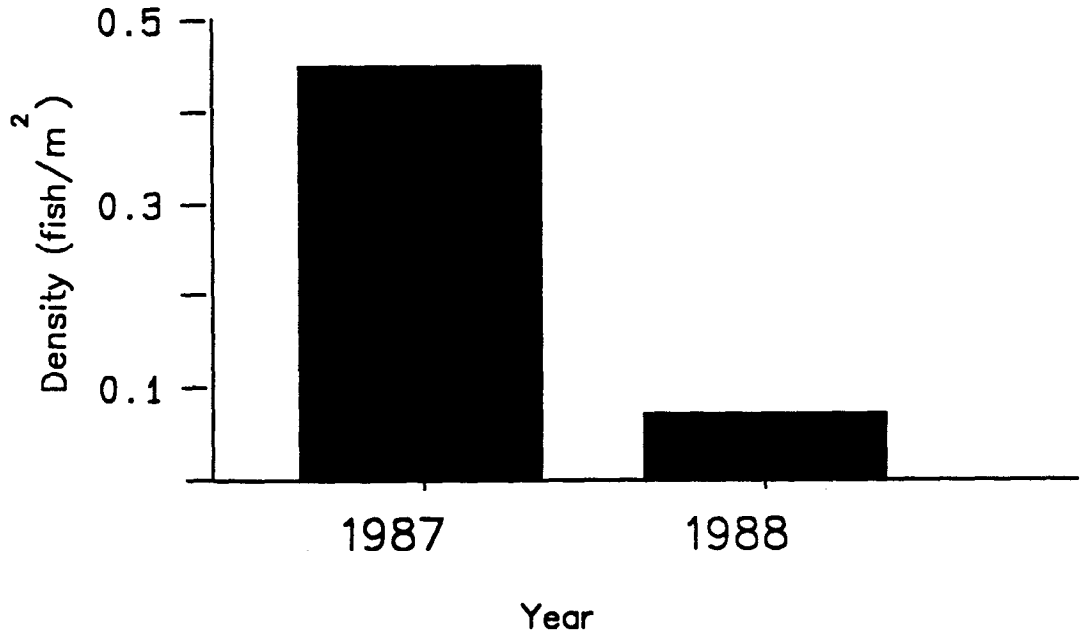

Figure 3. Age I cutthroat trout density (fish/m^2) in pools of Cache Creek where all fishes were removed in 1986.

Stocking Cutthroat Trout Fry in a Stream with Brook Trout

There has been a gradual increase in the abundance of age I cutthroat and brook trout during the 1984 to 1988 period (Figure 4). The slightly reduced abundance of cutthroat trout in 1988 might be due to the poor condition of fry stocked in 1987.

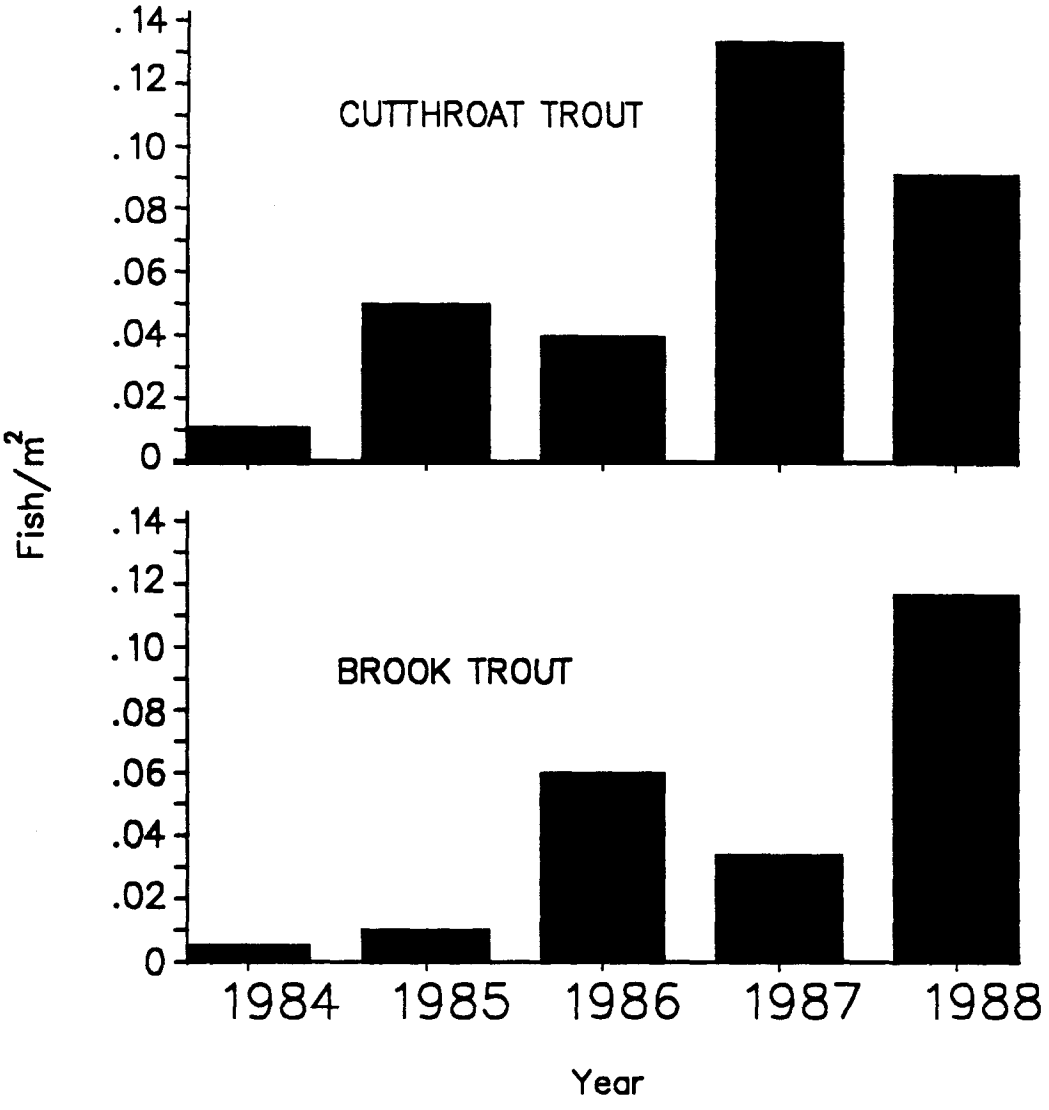

Figure 4. Age I cutthroat trout density (fish/m^2), and age I brook trout density (fish/m^2) in Blacktail Creek where cutthroat trout fry were stocked from 1984 through 1988.

In Jost Creek, where brook trout were present and cutthroat trout fry were stocked only in 1984 (Figure 5), densities of age I brook trout changed little during the 5-year period. Densities of age I cutthroat trout increased in Jost Creek following the 1984 stocking, but then decreased to low numbers again in subsequent years.

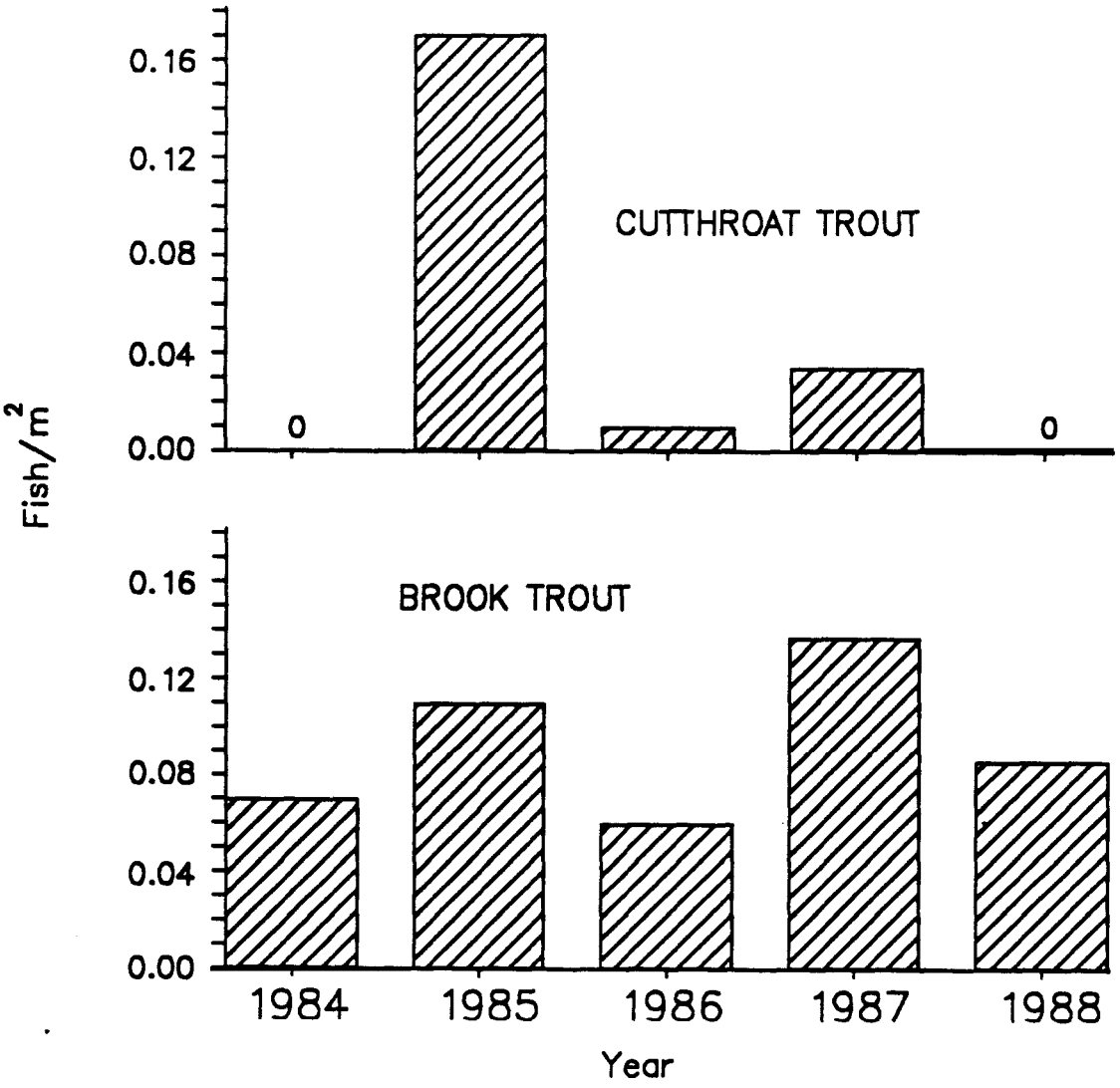

Figure 5. Age I cutthroat trout density (fish/m^2), and age I brook trout density (fish/m^2) in Jost Creek which served as an experimental control.

Stocking Cutthroat Trout Fry in Streams with Cutthroat Trout

Packer Creek contained only a few (no age I fish counted in 1984) cutthroat trout that resided upstream from the barrier before it was stocked with cutthroat trout fry in 1984. Following the initial introduction of fry in 1984, the density of age I cutthroat trout increased to 0.31 fish/m^2 and remained above 0.1 fish/m^2 through 1988 (Figure 6).

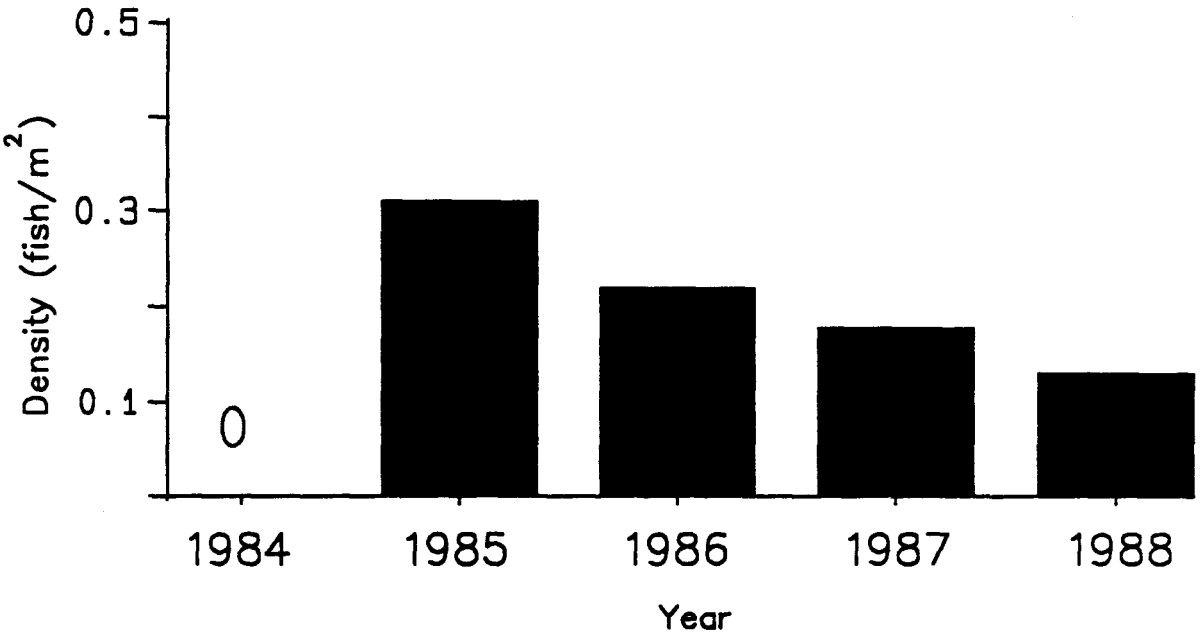

Figure 6. Age I cutthroat trout density (fish/m^2) in pools of Packer Creek.

Restrictive Angling Regulations

After the tributaries were closed to fishing in 1982, the density of cutthroat and brook trout in counted sections increased (Figure 7), but these increases may be due in part to a change in sections counted. The size of the study sections changed from 100 m in 1982 and 1986 to 0.5 or 1.0 mile sections with 5 or 10 pools in 1987 and 1988. The response of cutthroat trout to the closure of fishing was less in the west side tributaries than it was in the east side tributaries (Figure 7), perhaps because the higher densities of brook trout impeded the response of cutthroat trout to the tributary closures.

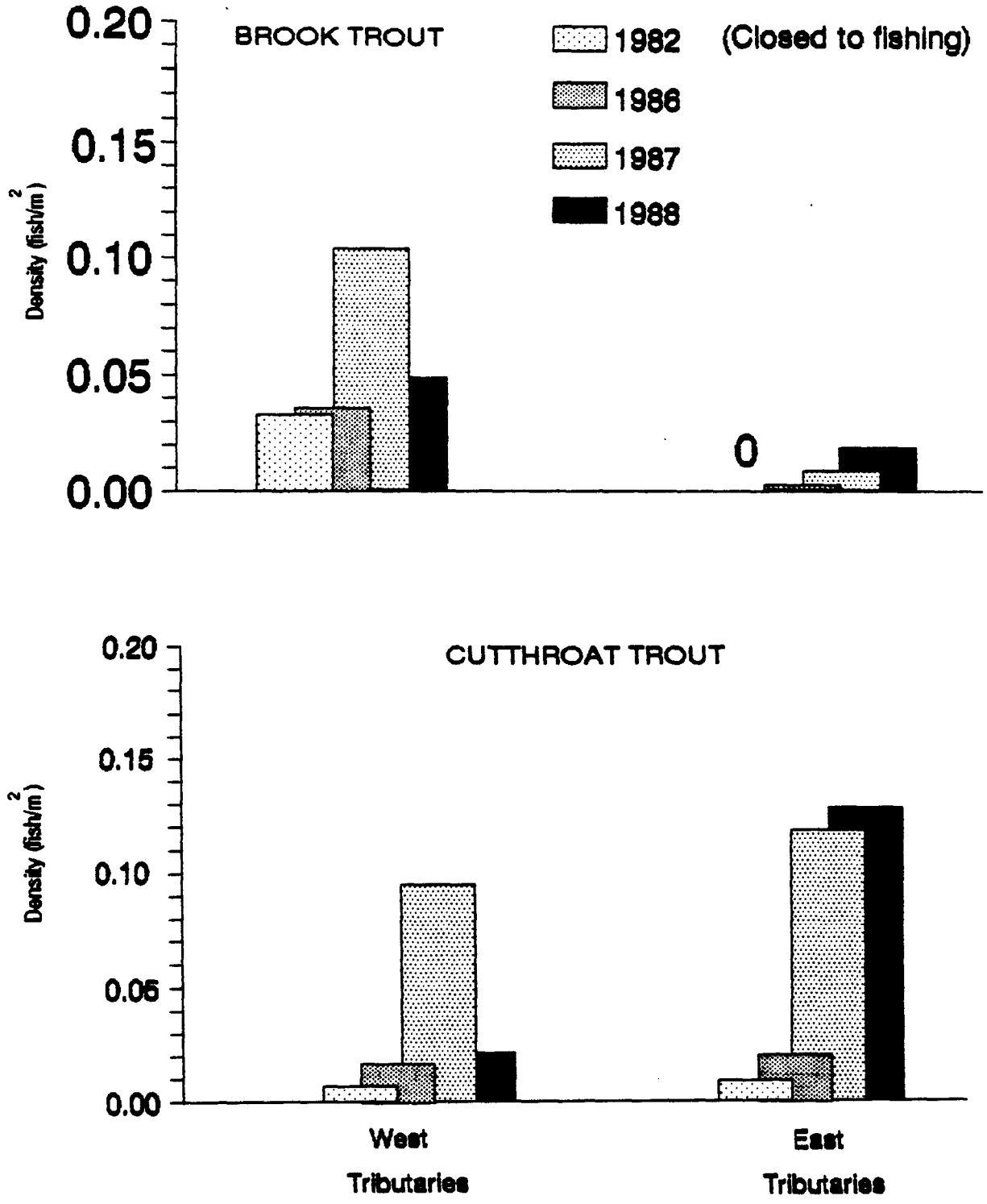

Figure 7. Densities of all ages of brook trout (fish/m^2) and cutthroat trout in tributaries on the east and west sides of Priest Lake.

References

Bjornn, T.C. 1957. A survey of the fishery resources of Priest and Upper Priest Lakes and their tributaries, Idaho. Master's Thesis, University of Idaho. Moscow.

Cowley, P.C. 1987. Potential for increasing abundance of cutthroat in streams by stocking fry and removal of brook trout. Master's Thesis. University of Idaho, Moscow, Idaho.

Griffith, J.S. 1972. Comparative behavior and habitat utilization of brook trout *Salvelinus fontinalis* and cutthroat trout *Salmo clarki* in small streams in northern Idaho. Journal of Fisheries Research Board of Canada 29:265-273

Irving, D.B. 1987. Cutthroat trout abundance, potential yield, and interaction with brook trout in Priest Lake tributaries. Master's Thesis. University of Idaho, Moscow.

Mauser, G.R., and V. Ellis 1985. Enhancement of trout in large north Idaho lakes. Job performance report F-73-R-6, Study III, Job 2. Idaho Department of Fish and Game, Boise.

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